TVA DataManager

Instruction Manual
Toxic Vapor Analyzer
Part Number CR015EW
6Mar2008

Thermo SCIENTIFIC

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The DataManager is Factory Mutual approved for operation in Class I, Division I, Groups A, B, C, and D hazardous locations. It should be used only with an FM approved TVA1000B. Use with a Cenelec approved TVA1000 voids the intrinsic safety rating.

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CHAPTER 1
INTRODUCTION

The TVA DataManager is an optional sampling probe and data entry system designed for use with the TVA1000B analyzer in fugitive emissions applications. (The DataManager can be retrofit to early versions of the TVA1000, although some modifications to the analyzer may be necessary.) The DataManager streamlines fugitive emissions monitoring by allowing the user full control of the analyzer from a handheld keypad, by minimizing manual entry of data and providing improved route management capabilities.

The TVA DataManager system includes four components. The first is a hand held keypad with display that permits access to all of the electronic features of the TVA1000 and allows editing or adding information to an uploaded route database. The second component is a separate sampling probe with integrated filtering, a one-button keypad, and an LED based status indicator. The third component is a highly adjustable carrying system that is designed to reduce operator fatigue. The fourth component is an improved firmware system that allows operators to configure the TVA's embedded database and display layout to best meet the specific needs of their fugitive emissions program.

The keypad includes a full set of alphanumeric keys, five function keys that are linked to common fugitive emissions operations, and four arrow keys for easy navigation of the menus. A eight-line by twenty-character display supports user defined screen layouts and may be backlit for better visibility. The keypad provides access to many of the instrument's hardware functions that were previously only available from the TVA side pack. In addition, while using this system, the operator can quickly move between monitoring points, can record time-stamped emissions measurement results for each monitoring point, can add notes for each database record, and if necessary, can also add new data records to the route database. For frequently used data fields, user-defined "pick lists" are used to enter standard selections, thus leading to greater efficiency and consistency in data entry and management.

The DataManager sampling probe is also designed to better meet the needs of route-based fugitive emissions monitoring programs. The sample probe contains a single-button keypad that serves the same function as the "Enter" key on the keypad, and can therefore be used to initiate data logging. The probe also has a highly visible 360° red LED, which will flash in differing patterns to indicate various operational conditions (prompt mode, error mode, etc.) During actual emissions measurements, the flash rate increases logarithmically as the measured concentration approaches the leak definition. The probe also has an improved filtering system, consisting of a sintered metal particulate filter backed-up by a membrane filter that prevents water from being drawn into the analyzer. There is also a clear viewing window that allows the presence of moisture to be visually detected.

The third component of the DataManager system provides new carrying options. The standard system has a protective carry bag, with shoulder and waist straps. The carry bag protects the analyzer during use and connects to the shoulder and waist straps using color-coded clips. A pouch for the DataManager keypad, which protects it when not in use, and a clip to secure the probe are attached to the waist strap. As an altenative to the pouch, a keypad glove is provided that protects the keypad while it is in use. An optional framed backpack is also available to allow the user to wear the carry bag on his or her back as an alternative carrying option.

The DataManager firmware provides improved flexibility by allowing the operator to define what fields will be included in each database record and by allowing the operator to have some control over how information will be organized on the handheld display. The flexible database configuration and control of the display layout are implemented by use of “headers” or blocks of information that are uploaded to the TVA by the operator’s fugitive emissions management and reporting software. For operators who are not using one of the third party database management and reporting programs, the ability to configure the TVA database has been added to ThermoConnect, which is Thermo Fisher Scientific’s own PC-based communication software. Within the ThermoConnect program, a step-by-step series of instructions called the “build route file template” provides a prompted method of defining what fields exist within the route database and the position in which they should appear on the handheld keypad display.

PROBE DESCRIPTION

The DataManager sampling probe is designed for route-based fugitive emissions monitoring programs. Key features of the probe are a single-button keypad that serves the same function as the "Enter" key on the handheld keypad, a highly visible 360° red LED that will flash to indicate various operational conditions, and an improved filtering system. There is also a clear viewing window that allows the presence of moisture to be visually detected. The figure below shows the sampling probe.

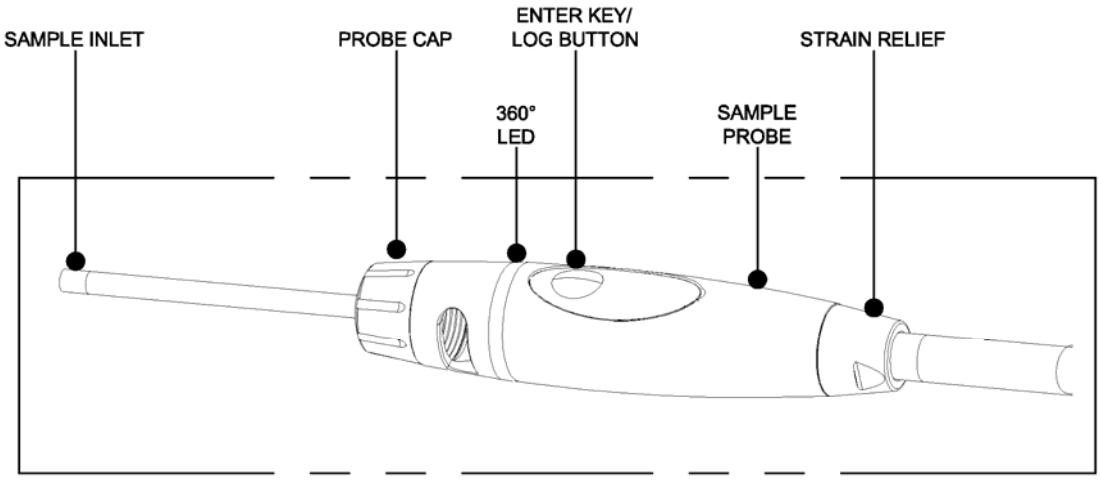


Figure 1-1. DataManager Probe

Keypad

The single button keypad on the sampling probe acts primarily as the "Enter" key to facilitate single-handed operation, including logging a data point. It has a high activation force to avoid accidental button presses.

360° Red LED

The LED will flash to convey information to the user so that it is not always necessary to observe the display on the handheld keypad. This makes taking a measurement easier by allowing the user to focus primarily on the probe at the point to be monitored. The LED flash patterns and their meaning are as follows:

- The LED flashes to reflect the concentration level. It acts like a Geiger counter, meaning that the blink rate increases as the concentration approaches the alarm level. If the alarm level is exceeded, then the LED will stay on continuously.
- The LED flashes to prompt the user to respond to a screen. It will blink twice one second, then off for one second, in a continuous pattern.
- The LED flashes to signal that an error has occurred. It will blink on for one second, then off for one second, in a continuous pattern.

Filtering System/Viewing Window

The sampling probe has an improved filtering system that consists of three parts. The first part is a sintered metal filter, which removes any particulates from the sample. The second part is a membrane filter that prevents water from being drawn into the analyzer. Both filters can be easily replaced in the field or cleaned (Refer to the "Maintenance and Spare Parts" section of this manual.) The third part is a transparent viewing window that is located between the two filters, which gives a visual indication that some liquid has been drawn into the probe.

ACCESSORIES

The TVA Data Manager package comes with a set of standard accessories that includes a carry bag for the TVA1000 sidepack, shoulder and waist straps, a pouch and glove for the Data Manager handheld keypad, and an adjustable probe clip to "holster" the probe. A backpack module is available as an optional accessory. These accessories are modular and can be configured in different ways to accommodate the user's comfort or convenience.

Carry Bag – The TVA carry bag provides protection for the TVA1000 side pack as well as a means of carrying it in the field. Features of the bag include a pocket with a Velcro flap, a viewing window to see the hydrogen pressure gauge, a carrying handle, and a snap loop for cable management. Quick-connect snap buckles are used to connect to the straps or backpack module.

Shoulder Strap – The shoulder strap is buckled to the carry bag, is adjustable, and includes a heavily padded section for comfort.

Waist Strap – The waist strap may be buckled to the carry bag, is adjustable, and contains a long Velcro flap that allows the user to route the cable from the handheld keypad inside the waist strap to keep it out of the way.

Keypad Pouch – The keypad pouch is a pocket that can be worn on the waist strap or backpack harness that is for storing the handheld keypad when it is not in use. It contains a pocket for spare identification tags and loops to hold markers or pens.

Keypad Glove – The keypad glove is a slip-on cover with a clear window to protect the keypad while it is in use. It is easily installed and removed using a zipper on the back, and includes a D-ring so it can be hung on a clip when not in use.

Adjustable Probe Clip – The adjustable probe clip is a 1-inch wide strap containing a spring snap that can be worn on the waist strap, backpack harness, carry bag, or other areas. It is used to holster the probe, and it clips to the split ring located on the Data Manager probe. It can also be used to secure the keypad glove.

Backpack Module (Optional) – The backpack module allows the user to wear the TVA side pack on his or her back. The TVA carry bag is clipped directly to the backpack module, which adjusts to different sizes, contains metal stiffeners, and is ventilated for comfort. It also contains Velcro flaps that can be used to route the keypad cable in a similar fashion to the waist strap.

There are a few things to note regarding assembly of the accessories. To show how to make the connections, the buckles on the shoulder strap and waist strap are color-coded with small decals corresponding to the mating buckles on the TVA carry bag. The backpack module also has these color codes to show how to properly mount the bag onto the backpack frame. Note that if the backpack module is used, then the shoulder strap and waist strap cannot be connected to the carry bag.

The keypad pouch and the adjustable probe clip were both designed with three sets of snaps that allow them to be worn on a 2-inch wide belt (backpack) or on a 1-inch wide belt (waist strap). The probe clip can also be attached to a variety of other places, such as the TVA carry bag itself, when it is worn on the side with the waist and shoulder straps.

The following pictures show the different ways that the accessories can be configured:

Same-shoulder mounting with waist strap. (Keypad cable is routed inside red flap of waist strap.)

Cross-shoulder mounting with waist strap. (Keypad cable is routed inside red lap of waist strap.)

Backpack mounting, front view. (Keypad cable is routed inside red flap of backpack.)

Backpack mounting, side view. (Keypad cable is routed inside red flap of backpack.)

SPECIFICATIONS

Data Storage	2,800 points in typical fugitives emissions mode 900 points if all fields use maximum character length
Maximum Number of Fields	15 (plus one dedicated for optional logging comment)
Maximum Number of Pick Lists	8 (including the two default pick lists – Leak Source and Repair Method)
Maximum Record Length	375 Characters
Intrinsic Safety	Class I, Div 1, Groups A, B, C & D (FM Certified)
Operating Temperature	40 to 105°F (4 to 40°C)
Dimensions	4.125” (W) x 7.5” (H) x 1.75” (D) / 105mm (W) x 191mm (H) x 45mm (D)
Weight	2.7 lbs (1.2 kg)
Standard Accessories	Analyzer softpack, shoulder and waist strap, keypad pouch, keypad glove, and adjustable probe clip

CHAPTER 2
INSTALLATION

The TVA Data Manager mounts to the TVA side pack, plugging into the existing sample and electrical connectors on the TVA1000. The Data Manager hardware consists of three main parts: the handheld keypad, the sample probe, and the junction box. The junction box is a molded plastic shell that contains the electrical connections and sample line connection. It ties the keypad and probe together with the wiring, sample line, and the wire-wrapped protective tubing. This protective tubing moves freely inside the junction box to allow the user to easily replace the Teflon sample line (see Chapter 4, "Maintenance and Spare Parts," for details.)

In addition, a stainless steel roll bar and a cable strain relief block are attached to the TVA sidepack to provide protection for the cable and tubing connections.

HARDWARE SETUP

The figure below identifies the main components of the TVA Data Manager.

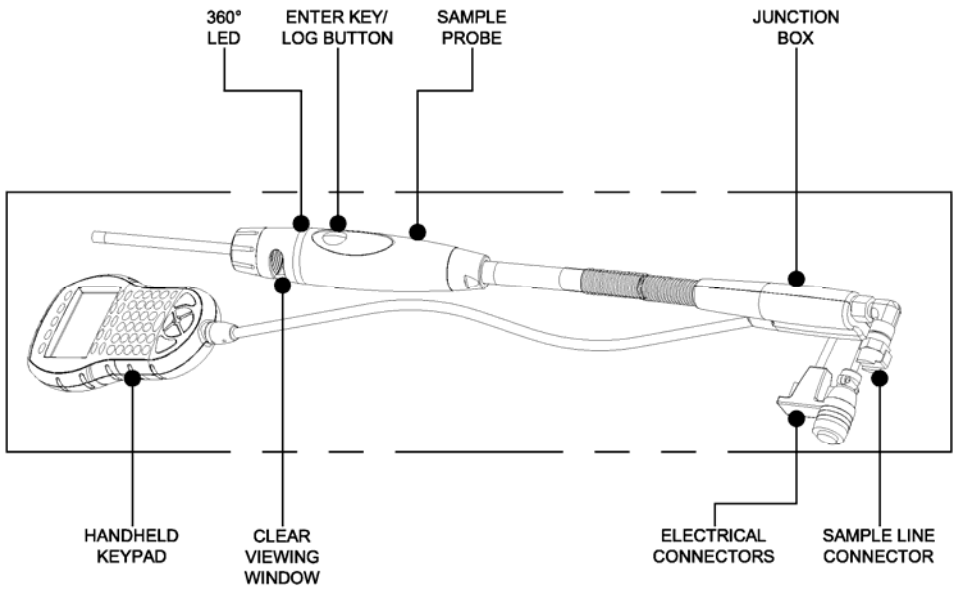


Figure 2-1. DataManager Components

The TVA DataManager can be installed on any new TVA1000, as well as existing units in the field, provided the firmware is at least version 030000P. (If your unit's firmware is an earlier version, please contact Thermo Electron's technical support group.) No tools are required for the installation.

NOTE: The DataManager should be installed only when the TVA1000 is turned off.

INSTALLATION

To install the TVA DataManager: (See Figure 2-2)

1. Remove the hydrogen cylinder from the TVA1000 (reverse thread.)
2. Remove the shoulder strap link (key ring) from the boss next to the panel with the sample line and electrical connections.
3. Connect the sample line fitting, 7-pin circular connector, and 9-pin D-Sub connector from the Data Manager to the appropriate locations on the panel of the TVA1000.
4. Install the roll bar by placing it over the flange where the hydrogen cylinder sits and on top of the boss that held the key ring. To lock the roll bar in place, install the hitch cotter pin into the boss in place of the key ring, which is no longer needed.

   (Note that the key ring may be installed if the user prefers not to use the carry bag.)
5. Re-install the hydrogen cylinder into the TVA1000.
6. Install the strain relief block by taking the larger block and placing it over the top of the roll bar. Take the smaller block and place it under the plastic junction box of the cable assembly. Install the two 1" long screws, but do not tighten completely. Slide the junction box close to the sample connection, leaving approximately ¼" of sample line showing. Tighten the two screws until snug.

   Install the ½" screw into the larger block, but do not tighten. Slide the block along the roll bar until the sample tube fitting is parallel to the junction box. Tighten the screw to secure the block to the roll bar.

IMPORTANT: Failure to install the roll bar and strain relief block may void the warranty.

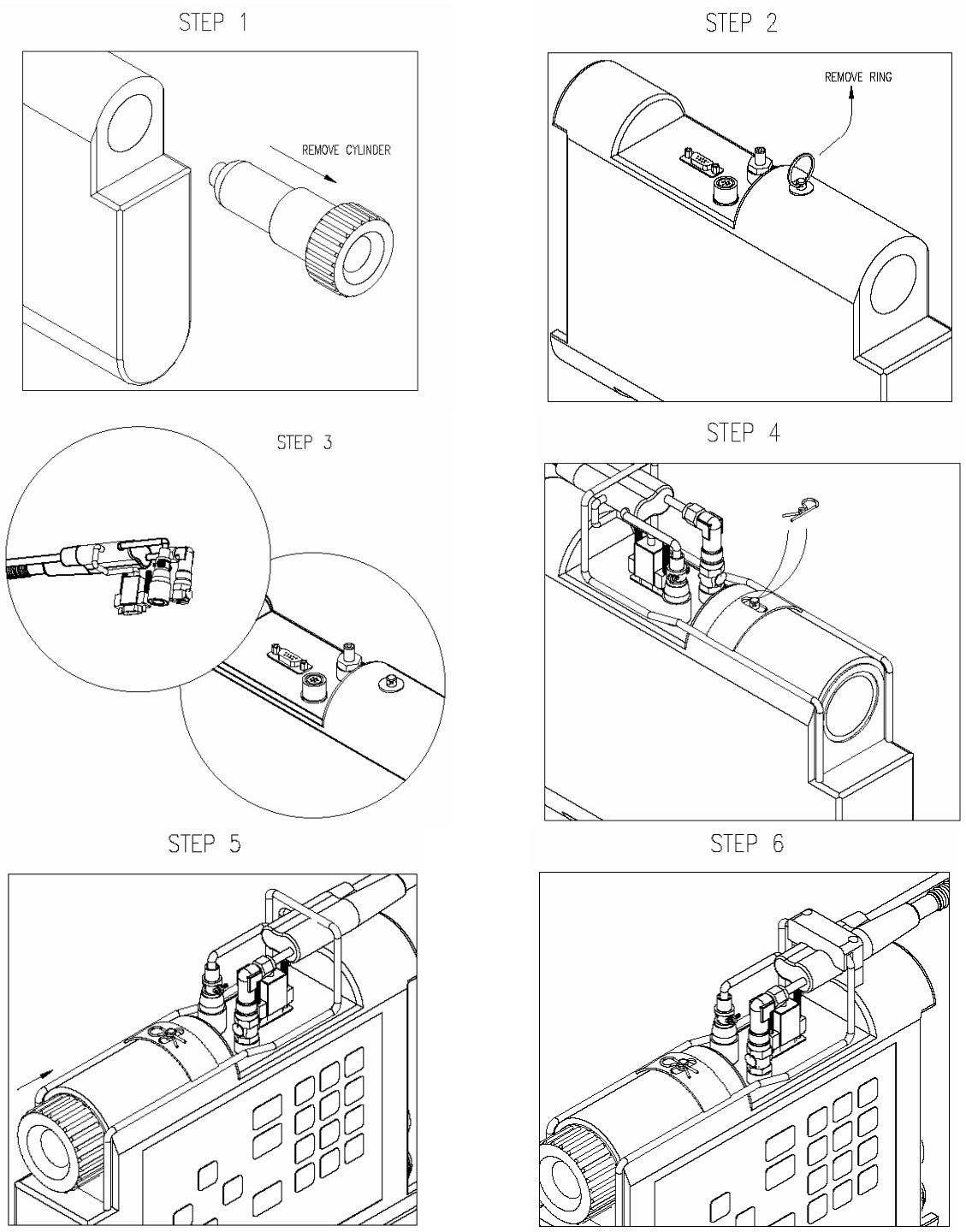


Figure 2-2. DataManager Installation

CHAPTER 3
OPERATION

This chapter describes the handheld keypad, handheld keypad buttons, main menu, embedded computer, and database capabilities.

KEYPAD DESCRIPTION

The handheld keypad has a full set of alphanumeric keys, five function keys ("shortcut" keys) that are linked to commonly used operations, and four arrow keys for easy navigation of the menus. The keypad includes a liquid crystal display that may be backlit for better visibility. It also provides access to many of the instrument's hardware functions that were previously only available from the TVA side pack.

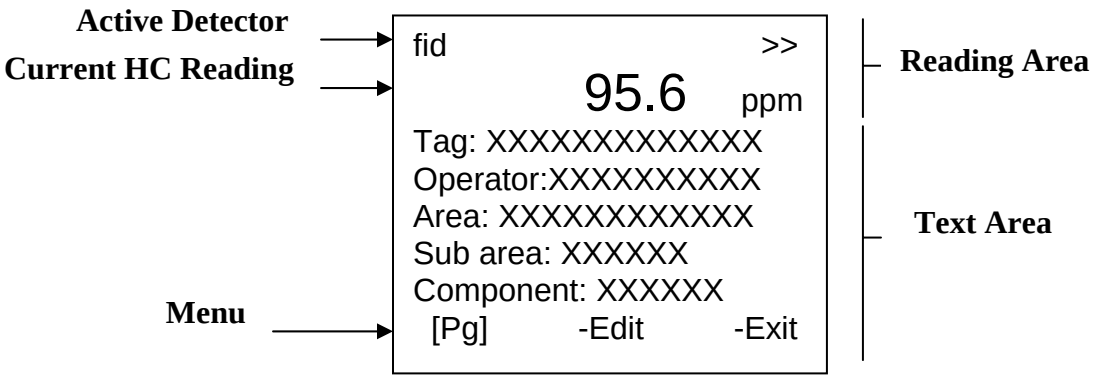
Handheld Keypad Display

The display is divided into two areas:

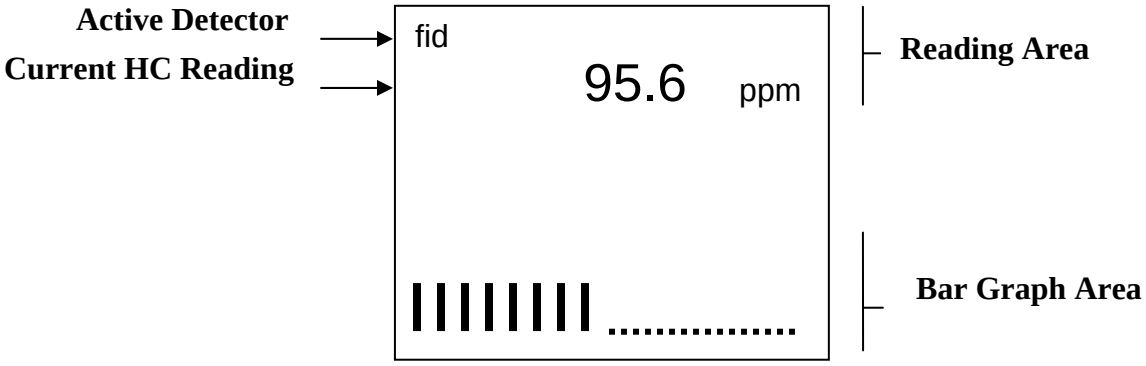
Reading. While in run mode, this area covers the top two lines of the eight-line display and provides a real time update of the concentration reading from one detector (either the FID or PID). The currently active detector is displayed in the upper left corner. The concentration reading is displayed in double height characters near the center of this area and the unit of measurement, either ppm or %, is shown to the right. The concentration reading can be displayed in up to 5 digits including the decimal point. The "Reading" area also includes an overflow indicator (>>) that will appear in the upper right corner if the signal exceeds the allowable range. All displayed items in the Reading Area shut off when the instrument is not in run mode.

Text. The "Text" area provides either a 6 line x 20 character alphanumeric display or a bar graph that provides a graphical indicator of the current concentration reading. Alphanumeric and bar graph modes are mutually exclusive, and for fugitive emissions applications, the bar graph mode will rarely be used.

Depending on the current operating mode, or status of the analyzer, the text area of the display will show any one of several different screens. In cases where a screen requires more information than can reasonably be shown in the text area, that screen will include multiple pages. In those cases the operator can switch between pages by pressing the arrow keys.



DataManager Screen
(Text Mode)



DataManager Screen
(Bar Graph Mode)

Handheld Keypad Buttons

Special Function Keys (5):

MENU — Primarily used to bring up the menu system on the keypad display and choose a menu item for selection. Also used to bring up the sidepack control menu when not in run mode.

INFO — Display/hide the system information screens.

B-SUB — Initiate background measurement for subtraction.

BKLT — Toggle display backlight on/off.

TAG — Display/hide the route tag menu.

Navigational Arrow Keys (4):

UP, DOWN — Used to traverse menus and editing fields.

LEFT, RIGHT — Used to traverse menus and editing fields.

Alphabet A-Z (26), Space, Decimal, and Pound Keys:

Used to enter data into editing fields. The # key cycles through a selection of symbols. The symbols include # ? ! & @ - + = ( ) < > , : / * %

Numeric 0-9 (10) Keys:

Used to traverse sidepack menus and enter numeric data into editing fields.

Enter Key:

Used to select menu items and save editing fields.

Exit Key:

The Exit Key has different functions depending on the screen displayed on the handheld keypad at the time of the key press:

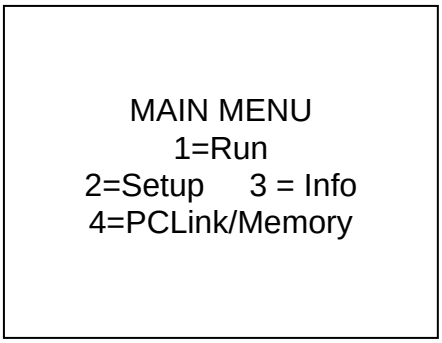
Screen	Function of Exit Key
Error	Send EXIT key to sidepack to cancel error
Info	Deactivate info screen
Tag Edit	Clear edit field
Tag	Deactivate tag screen
Background	Send EXIT key to sidepack to cancel bgnd
Menu	Deactivate menu screen
Bargraph	Send EXIT key to sidepack to exit run

MAIN MENU

Installation of the DataManager does not change the basic operating procedures or main menu structure of the TVA1000, both of which are described in the instrument user's manual. However, the DataManager does allow easy access to the TVA menu system and it allows the operator to perform tasks that were previously only available through the display and keyboard located on the sidepack. For example, with the DataManager installed, the operator will be able to relight the FID after a flame-out, or run a complete calibration without removing the instrument from the carry bag.

In addition to providing improved access to the TVA's embedded software, the DataManager also provides the ability to easily access and edit route information that has been uploaded from a fugitive emissions database program.

When the TVA1000 is first turned on, the Main Menu, which is shown below, will appear on both the DataManager display and on the sidepack display. To select an item from the Main Menu, the operator simply presses the corresponding number key on the DataManager keypad. Detailed discussions of selections 2, 3 and 4 (SETUP, INFO, and PC LINK / MEMORY) can be found in the TVA1000 manual and will not be repeated here. The structure and function of selection number one (RUN) is critical to the operation of the DataManager and is therefore described in some detail below.



Main Menu

When "RUN" is selected from the main menu, the TVA1000 automatically lights the FID flame and then enters the "RUN" mode. The DataManager display will show the Bar Graph screen with the current hydrocarbon reading presented digitally at the top of the screen and in the form of a logarithmically scaled bar graph at the bottom of the screen.

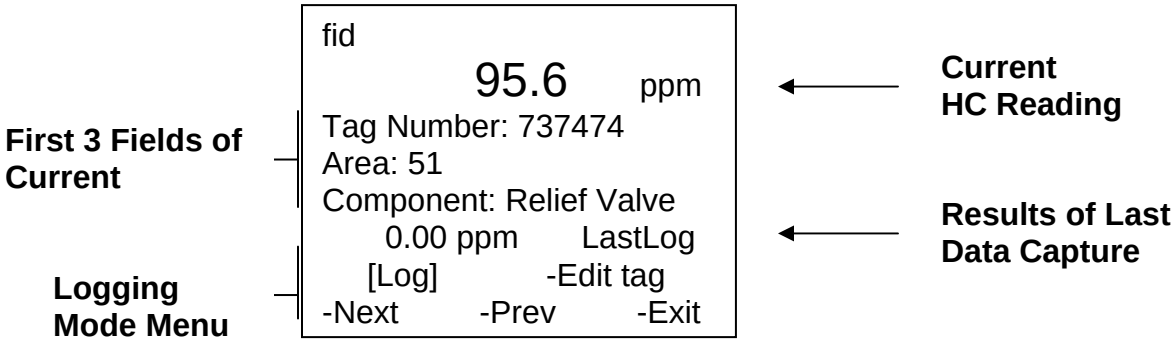
From the Bar Graph screen, the operator can select any of the function keys located at the top of the keypad, just above the display. Some of the function keys open new screens. The operations associated with the function keys are as follows.

Menu

The MENU function key is used to activate the DataManager's Logging Mode. (Note: because the MENU key also serves to move the cursor, in some cases it may be necessary to press MENU and then select [EnterLogging Mode]). Most routine activities that are required for fugitive emissions monitoring will be executed from the Logging Mode.

The appearance of the Logging Mode screen will vary somewhat depending on the structure of the fugitive emissions database that was loaded into the TVA1000's embedded computer system. An example of a typical Logging Mode screen is shown below.

The field names and their relative locations on the screen probably will not match those shown in the example. However, in all cases the top three lines of the text area will display the first few fields in that record, the fourth line of the text area will show the results of the most recent data logging activity, while lines five and six will show the Logging Mode Menu. As in other DataManager screens, menu items are selected by moving the brackets to the intended choice with the arrow keys and then pressing the ENTER key.



Sample Logging Mode Screen

Although the total number of pages will depend on the number of route entries in the database structure, the Logging Mode screen will usually include more than one page. To move between pages, select the appropriate menu choice (Next or Prev) and press ENTER.

Menu functions accessible from the Logging Mode screen are as follows:

Log. Selecting "Log" starts the data-capture, or logging, sequence as defined by the user. During this sequence, a timer counts down and the unit captures the selected FID or PID reading (maximum, average, or current) that occurs during that interval. At the end of the logging period, the selected value is displayed at the center of the third line from the bottom, and the operator is presented with a new set of menu choices. At this point, the operator may save the data, add a comment, note a repair effort, start the logging sequence over again, or exit without saving the new data point.

Edit tag. Selecting "Edit Tag" allows the operator to edit text fields in the current record, such as the tag number or area description.

Next. Selecting "Next" brings the next record in the current route up on the DataManager screen. Note that the order of database records is determined by the sequence in which they were up-loaded. That is, records are not sorted by tag number.

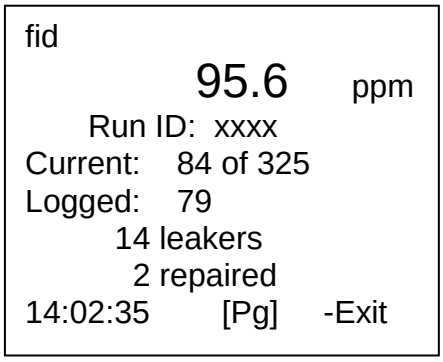
Prev. Selecting "Previous" steps the operator back to the previous record back in the current route database. Again, note that the sequential order of database records is determined by the sequence in which they were up-loaded. That is, records are not re-ordered or sorted by tag number after uploading.

Exit. Selecting "Exit" takes the DataManager out of the logging mode.

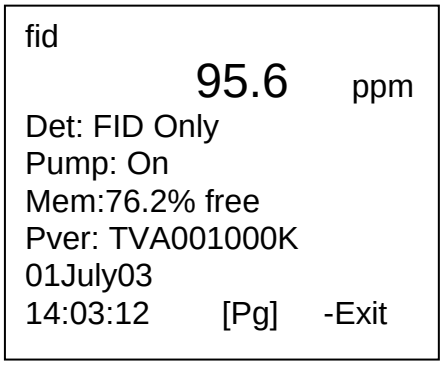
Note: While in the Logging Mode Screen, the operator can type in any tag number and it will go directly to that tag instead of having to scroll through the route using NEXT and PREV. As a number is being entered, an "Enter New Tag" screen will appear, the tag number is entered, then the operator either "Accepts" the new tag or "Exits" the screen.

Info

The INFO function key brings up a two-page screen that presents status information on the route, such as the current route entry being monitored, the number of route entries that have been logged, and the total number of "leakers" detected so far. The INFO screen also provides quick access to information on the TVA hardware status such as the detector used, the percent of logging memory space remaining (Mem), and the probe EPROM version (Pver). Examples of page 1 and 2 of the INFO screen are shown below. Selecting "Pg" with the Enter key toggles between the pages.



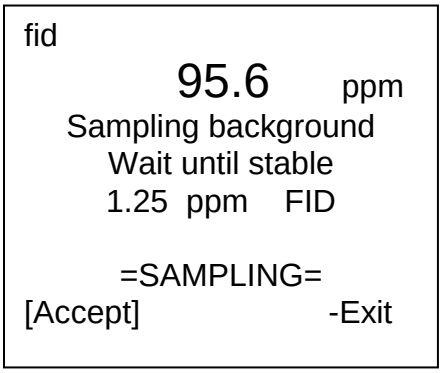
Info Screen - Page 1



Info Screen Page - 2

B-Sub

The B-SUB function key initiates the background subtraction routine. This allows the operator to measure and record the "background" level of hydrocarbons in ambient air. That background reading that will then be used to adjust the TVA1000 measurement results collected from that time forward. The B-SUB screen is shown below.

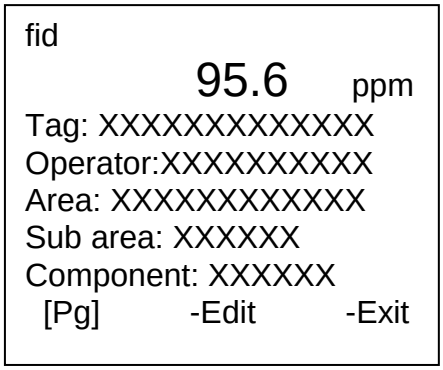


Bklt

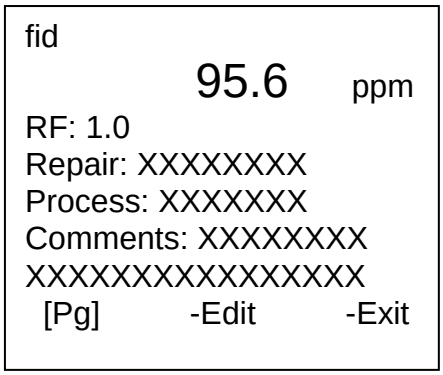
The BKLT function key turns the display backlight on and off.

Tag

The TAG function key allows the operator to edit or create a new database record or "tag" while in the field. The appearance of the TAG screen and the number of pages will vary depending on the structure of the database that is currently loaded in the TVA memory. One example of a typical TAG screen is shown below.



Example Tag Screen - Page 1

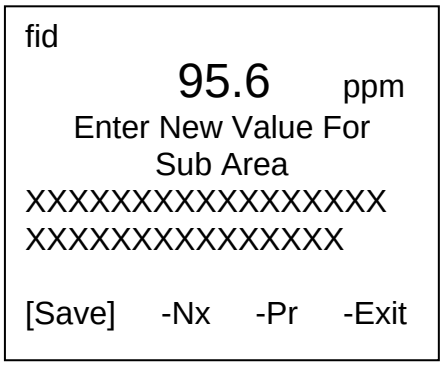


Example Tag Screen - Page 2

Note that database record structure, including the number of fields, the field types and the field labels are controlled by information loaded into the TVA1000 as part of the route database. The number of pages included in the TAG Screen will automatically expand to include all of the fields that are included in the database. In all cases, the bottom line of each page will show the three menu selections: Pg, Edit, and Exit.

As in the other DataManager screens, menu items are selected by moving the square brackets with the left and/or right arrow keys and then pressing ENTER. The operator can scroll through each page of the TAG screen by selecting Pg, can exit out of the TAG screen by selecting Exit, or can enter the Tag Editing Mode by selecting Edit. Once in Tag Editing Mode, the DataManager display will show only one field at a time. The value or text for that field can be edited using the full alphanumeric keypad, unless the field was defined as non-editable in the route definition. (Note that pressing the Exit key clears the previously entered value when editing.) If the field has a pick list associated with it, one of the pre-defined values can be selected.

As shown in the example below, the menu selections available in Tag Editing Mode include Save, Nx (next), Pr (previous), and Exit. Any edits that are made from this screen must be saved before exiting this screen or they will be lost. Once all the field edits have been saved, selecting Exit will return the unit to the run mode, or whatever operating mode the unit was in when the TAG function key was pressed. A Sample Tag Editing Screen is shown below.



Example Tag Editing Screen

USING THE DATAMANAGER'S ROUTE MANAGEMENT FEATURES

One of the primary advantages that the DataManager provides over the standard sampling probe is easy access to the analyzer's embedded computer and database capabilities. For routine fugitive emissions monitoring and control programs, a database of fugitive emissions information, usually called a route, can be uploaded to TVA1000. The DataManager allows information in the route/database to be easily accessed by the operator in the field. Emissions measurement data taken with the TVA can be added to each database record and the DataManager keypad allows the operator to add to or edit existing text, and to create and insert new records.

Use of the TVA1000's embedded routing capabilities can greatly reduce the amount of time spent collecting measurement data and entering it into the fugitive emissions database. Use of the embedded database can also reduce the risk of transcription errors that might occur when using a separate computer or paper based system, and it can reduce the amount of equipment that engineers and technicians are required to carry into the field.

For those unfamiliar with the terminology, a database is essentially a computer file that contains information organized into a series of records. Each record is broken down into a series of fields that contain specific information. For example, a telephone directory is a simple example of a database. Each entry in the phonebook is a record and each record contains three fields: name, address and phone number.

A fugitive emissions tracking and reporting database is usually called a route. It may contain thousands of records with each record representing a possible leak point, such as a valve or flange. Each potential leak point will likely be identified with a number, which is often referred to as the "tag."

Since the tag numbers serve as the primary index of potential leak points, every record will contain a field for the tag number. Most fugitive emissions databases will include fields for additional information, such as response factor, equipment location, and equipment type. The exact structure of the database can vary widely and is usually dependent on the type of tracking and reporting software that is being used, and on requirements of that specific work site.

In order to allow maximum flexibility, the embedded software provided with the DataManager includes a unique user configured database capability. By including a series of "headers" that describe the database structure at the top of the data file, the emissions tracking software can configure the TVA1000 to match the existing database structure. This flexible database structure can provide compatibility between virtually any third party software and a TVA1000 operating with the DataManager.

Creating a Database

The TVA1000 firmware with version numbers 030000P and above will support user defined route entry fields. As noted earlier, the user-defined fields are created by a "header" located at the top of the Database file. The first three lines of the data file must consist of the Route Title ("ROUTE DATABASE"), the Software Version Number and the Run ID number.

After the Run ID, there should be one blank line followed by three blocks of information that define the record structure. These blocks are titled "ROUTE FIELDS," "PICKLISTS," and "DISPLAY." An example of a typical database header is shown below. The text in the left column appears just as it would in the actual database file, while information in the right column is for explanation only, and would not be found in the actual database file.

Sample Database / Header

`ROUTE DATABASE`	Title line, required but not processed by TVA
`VER= 1.00`	Current embedded software version number
`RUN ID=0001`	As defined by the user
`ROUTE FIELDS` `------------`	Defines the start of the Route Fields definition
`T 16 Tag`	Creates a 16 character field called "Tag" of type tag
`H 13 DBID`	Creates a 13 character field named "DBID"
`P 15 Plant`	Creates a 15 character pick list named "Plant"
`S 8 Area`	Creates an 8 character string field named "Area"
`S 8 Subarea`	Creates an 8 character string field named "Subarea"
`L 5 Max`	Creates a 5 character Leak Rate field called "Max"
`R 4 RF`	Creates a 4 character Response Factor field called "RF"
`S 3 EQP`	Creates a 3 character string field called "EQP"
`P 3 EQPick`	Creates a 3 character pick list field called EQPick"
`N 6 Size`	Creates a 6 character number field called "Size"
`S 48 Description`	Creates a 48 character string field called "Description"
`PICKLISTS` `---------`	Defines the start of the section containing the pick list entries
`LABEL=Plant`	Pick List identifier (must match name in ROUTE FIELDS)
`HOUSTON 1`	first item on list
`HOUSTON 2`	second item on list
`LEFT OF TRACKS`	third item on list
`LABEL=EQPick`	Pick List identifier (must match name in ROUTE FIELDS)
`VLV`	first item on list
`FLG`	second item on list
`PMP`	third item on list

`DISPLAY` `-------`	Defines the start of the Display definition section
`Tag 1 1 16`	display the “Tag” field on line 1, column 1, for 16 characters length
`EQP 2 1 3`	display the “Equip” field on line 2, column 1, 6 long
`Size 2 10 6`	display the “Size” field on line 2, column 10, 6 long
`Max 3 1 5`	display the “Max” field on line 3, column 1, 5 long
`RF 3 12 4`	display the “RF” field on line 3, column 12, 4 long

```
      Tag             DBID             Plant         Area    Subarea   Max   RF  EQP EQP  Size  Description
---------------- ------------ --------------- -------- -------- ----- ---- --- --- ------ --------------
1                1000000001       HOUSTON 1        AREA1    SUBAREA1     0 1.00 N/A       1.00 DESCRIPTION 1
2                1000000002       HOUSTON 1        AREA2    SUBAREA2     0 1.00 BON       0.50 DESCRIPTION 2
3                1000000003       HOUSTON 2        AREA3    SUBAREA3     0 1.00 CSL       1.75 DESCRIPTION 3
4                1000000004       HOUSTON 2        AREA4    SUBAREA4     0 1.00 DFL      10.00 DESCRIPTION 4
5                1000000005       LEFT OF TRACKS   AREA5    SUBAREA5     0 1.00 PKG       5.50 DESCRIPTION 5

END
```

Route Fields. The “Route Fields” block defines the fields that each record will contain. Note that all records in any given database file must have identical structure and that there may be up to 15 route entry fields. The TAG field MUST be included in the database, so the minimum number of route entry fields is one.

Each line in the ROUTE FIELDS block contains three columns of information, the data type, the field width, and the title. The first column is a single letter that indicates field type. Allowed data types are as follows:

S	String (alphanumeric, used to store any text based information)
P	Pick List (alphanumeric, used for pre-defined string as discussed below)
N	Number (numeric, used to store any numeric data)
T	Tag (alphanumeric, required for all route database files)
H	Hidden Database Key (alphanumeric)
L	Leak Rate (numeric, holds “leak definition” or maximum allowed reading)
D	Dead Band Rate (numeric, holds the minimum conc. reading that can be reported)
R	Response Factor (numeric, holds TVA response factor for the target compound)
C	Comment (alphanumeric, used to store notes concerning that specific tag)

Note: The comment field is not actually stored as part of the route entry. Instead this item is stored with each logged data point. They are included in this section so the user may define the comment field size and label.

The second column of the route entry field defines the field width, which is expressed as the maximum number of characters that the field can hold. This value is used to define data storage size, to display data on the handheld keypad, and during file transfers. The tag field width can be 1 to 16 characters and all others can be 1 to 60 characters in length. As noted above, the maximum number of fields that can be utilized and the total field width of all defined fields may not be more than 375 characters.

The third column of the route entry field is the label, or title, for that field. The label is displayed as the column header in the route database file and on the handheld keypad display as a field prompt. Each label must be limited to a maximum length of 12 characters and each route entry field is ended with <CR><LF>.

Pick Lists. The second header block defines the PICKLISTS. A picklist is similar to a drop-down menu that might be used in a typical PC based application program. However, in the DataManager, the drop-down list is used to quickly enter pre-defined strings of text into a database field. Compared to a standard text string, the picklist has three major advantages. First, it is quicker and easier to select a text string from a list than it is to type in a new line of text. Second, use of a picklist ensures that different operators or technicians will use the same terminology, and third it minimizes the risk of errors during data entry.

Although use of picklists is not required, they should be used in place of standard text strings whenever practical. Two picklists, LeakSource and RepairMethod are so commonly used that they are pre-defined in the TVA1000 embedded software. A maximum of 8 picklists, including LeakSorce and RepairMethod, can be included in the database definition.

Each picklist may have up to 16 items consisting of no more than 16 characters each. The picklist definition consists of multiple lines of data. The first line is the picklist label as follows:

LABEL=llllllllllllllll

Where llllllllllllllll is the picklist label which is left justified and may be terminated by <CR><LF> at any time (does not require all 16 characters). The label must match the label previously defined in the ROUTE FIELDS section of the file. Each additional line is a picklist entry. The picklist is terminated by the start of a new picklist label, or by a blank line at the end of the PICKLISTS section.

As noted above, even if no user-defined picklists are loaded, default picklists, identified by the labels *LeakSource* and *RepairMethod*, are available in the analyzer. If the default text associated with those picklists is not appropriate, the defaults can be over-ridden by creating entries with the default labels in the database header. That is, if the label for one of the default picklists appears in the route database definition, the default entries in the analyzer are overridden by the entries in the definition. If one of the default labels (LeakSource or RepairMethod) appears as a label in the picklist block, but no entries follow the label, then the picklist will be empty.

Display. The next section of the file header is the DISPLAY block. This section defines what database fields are displayed on the Data Manager Handheld Keypad display while monitoring. Since there are only three lines of 20 characters each available on the display during monitoring, the user may select which fields are displayed (note that all route entry fields are visible if the user presses the TAG key on the Data Manager keypad).

The first column of the display field is the label for the route entry field to be displayed. This must match a label previously defined in the ROUTE FIELDS section of the file. The second column is the line number (1-3) to vertically locate this field on the display. The third column is the column number (1-20) to start displaying this field. The fourth column is the number of characters to display. If the number of characters to be displayed exceeds the number of characters available on the line, it will be wrapped to the next line (until the third line, when an error is generated.) If the number of characters to display is less than the number of characters defined in the ROUTE FIELDS section, the first n characters of the field are displayed. If the number of characters to display is shown as a negative number, then the last n characters of the field are displayed. When the file is transferred to the TVA, an error is reported if any of the display fields overlap or fall outside the three available lines.

Route Data. The route header line is composed of route entry field titles (line 1) centered over an underline of dashes (line 2) for each field. The fields are delimited with a single space. Each column is of width defined in the route entry field section. These two lines are ignored when receiving a route database file, so formatting is not critical.

The route entry format depends on the data in the Route Fields section. Each field goes from left to right in the order they were defined in that section. Each field is delimited by a single space. Numbers may be either left or right justified. Each database entry is ended with <CR><LF>.

Note: Downloaded route entries may be terminated any time after the tag by the <CR><LF>. Before the first entry is accepted, the instrument's route and log memory is cleared. Partial text entries are processed as ending in trailing spaces. Partial number entries are processed as if complete. The default values for fields not included in the entry are:

Field Type	Default
String	all spaces
Number	all spaces
Tag	all spaces
Hidden	all spaces
Leak rate	0.00
Dead band	0.00
Response factor	1.00

Operation with Third Party Databases

Many facilities that have an active fugitive emissions program are likely to have a third party database system, such as LeakDAS® already in place. In order to fully utilize the DataManager's flexible database capabilities the third party software must support the header structure described here and the DataManager communications protocol. Many of the more prominent vendors have incorporated this support into their current software versions of their products. Please contact your software vendor for more information.

Conversion of Existing Routes to New Format

1. Run ThermoConnect (version 010101) and ensure that it's set up to work with the TVA1000.
2. Connect the analyzer to the PC, configure the analyzer for Text-Auto transfer mode, and establish the link.
3. Load the file containing the route list in the "old" format into the analyzer using ThermoConnect.
4. In ThermoConnect, select from the menu Transfer, Receive to file, Route Database (all entries) to retrieve the route file in the updated route database format. Save this file with a new name. This allows the user to upgrade existing ROUTE LIST files to the new ROUTE DATABASE file format. Note the differences between the two files in the header information (double-click on each file to view in Notepad).

Creating a Sample Template Using ThermoConnect RouteBuilder Wizard

ThermoConnect, Thermo Fisher Scientific's TVA communication program, has been updated to include a Route Database File Template Builder (a.k.a. Wizard) and an additional file transfer option to retrieve only modified route database entries.

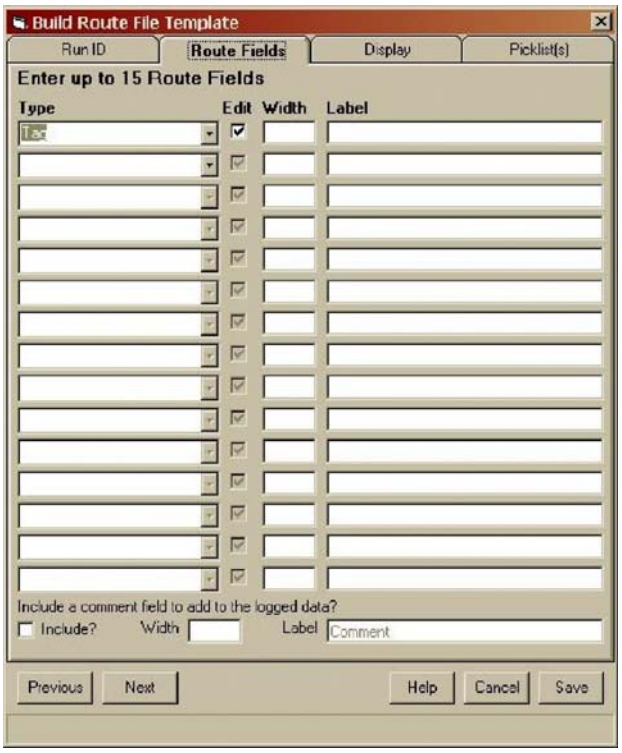
A "Serial Compatibility Mode" option has also been added to ThermoConnect. If this option is checked, it should work on all PCs using internal serial ports and external USB to serial converters. If the option is not checked, transfers will work faster, but it may not work on all PCs. (Reference the ThermoConnect help file for details.)

The steps below show how to generate a simple Route Database file and allow you to understand some of the basic operational features of the new Route Database File Template Builder. (Following the steps below are screen shots of Build Route File Template.)

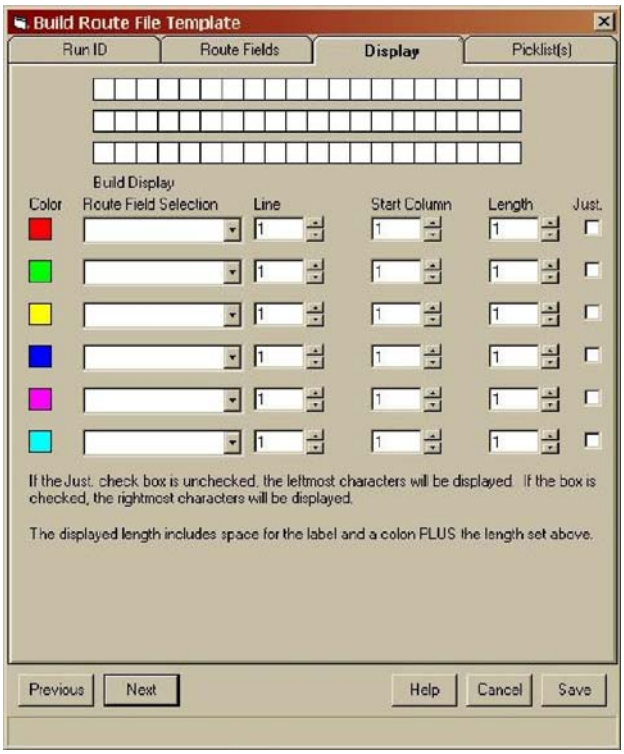
1. From the ThermoConnect menu, choose Edit… Build Route File Template (if this option doesn't show up, either the wrong version of ThermoConnect is installed or it is not configured for the TVA1000B analyzer).
2. The "Run ID" tab is first displayed. Type a run ID into the box and click Next.
3. The "Route Fields" tab is now displayed. Enter the width and label for the Tag field. Note that the width must be 16 characters or less for this field (all remaining fields may be up to 60 characters). Establish a width for this field of 16 and label of "Tag".
4. For each additional field (up to 15 total), select the type, whether or not it is editable, the width, and the label text. For example, for the second field choose "String" type with a width of 10 and a label of "Facility".
5. For the third field select the Pick List type, width of 6, label of "Color"
6. Add any other fields you desire.
7. Click Next to continue to the Display tab.
8. Select the Build Display Route Field Selection for the first entry and set it to "Tag". Notice by default it is placed on line 1 column 1 with the pre-defined length left justified. In this case, the 20 characters on the first line of the display are filled by the 3 characters in "Tag", the 1 character for the ":" separator, and the 16 characters for the tag string. This field is displayed on the first line with each block filled in with red representing a used character.
9. For the second entry, select "Facility". Note that it defaults to line 1 column 1. This now overlaps the Tag field. The overlapping data is shown in black blocks. To fix the overlap, change the line for "Facility" to 2 using the arrow keys.
10. Select "Color" for the third field and set it to line 3 column 5. The yellow blocks represent where the "Color" field will be positioned.

11. Click Next to go to the Picklist(s) tab. Note that this tab shows 3 available lists. The first two ("LeakSource" and "RepairMethod") are present even though they were not defined in the Route Fields tab because they are not part of the route, but may be used during the repair method while logging a route. If these picklists are empty, default values are used in the analyzer. The user may define a custom picklist for these fields on this tab.
12. Select the "Color" list, type "Blue" in the Add box, and click "Add" to add it to the list.
13. Repeat the above step to add "Yellow", "Green", "Chartreuse", and "Red".
    a. Even though the "Color" field is defined as 6 characters wide, each of the items in the pick list may be up to 16 characters. This is handy for further describing small fields within the pick list. An example would be using "VLV Valve" to report the equipment in a three character field but provide a better definition of the field selection within the pick list.
    b. Because of the 6 character defined width, "Chartreuse" will be truncated to "Chartr" when selected.
14. Click Save to save the file. A Create new file dialog box is presented. Enter a file name and click the save button. Make note of where you stored this file and its name. After the file is saved, a "Confirm Close" dialog box is presented. Choose Yes to close the wizard. The No option is available if it is desired to re-use the current data and modify it slightly to create another report definition template file.
15. Now the new file is highlighted. Double-click on the file to bring it up in notepad. Inspect the file to see what was created. Note the definitions for the route fields, the picklist items, and display locations. Also note that the actual route data contains all XXX's (or 0's for numeric fields, or 1.0 for response factor). Note that hidden and non-editable fields are also displayed here if defined because they must get loaded into the analyzer. To populate this route, simply replace the placeholder with real data. You must use the space bar to fill in empty spaces. DO NOT use the tab key. However, once you have entered the first record you may copy and paste that record into additional records and make simple modifications to the new entries.
16. Refer to the definition of the Route Database file included in this document for detailed information on what may be set in this file.
17. Save and exit Notepad and load this file into the TVA.
18. Enter run mode and witness what you have created.

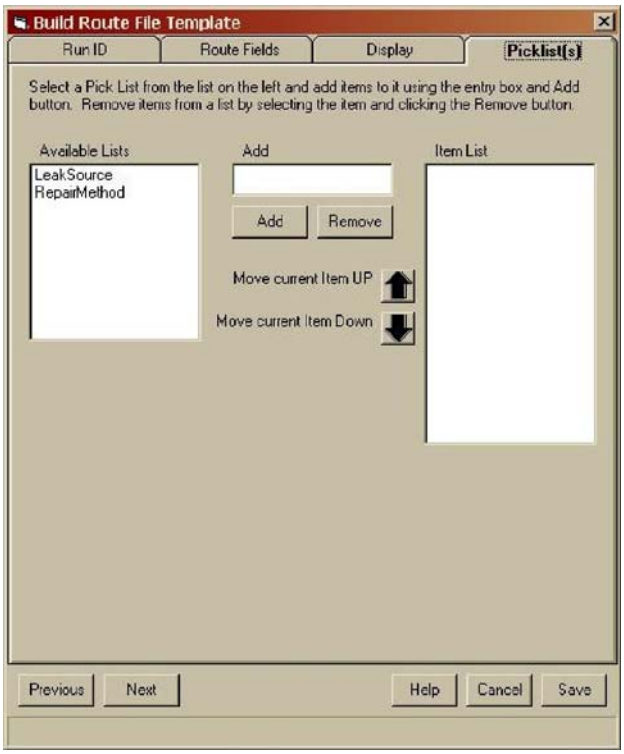
Screen shot for step 1.



Screen shot for step 3.



Screen shot for step 8.



Screen shot for step 11.

If you are using a third party text editor to create your database file, refer to Appendix A for detailed specifications.

Creating a Route from Scratch

To create the header with a text editor, simply open the database file and insert the required information at the top of the file and then save.

CHAPTER 4
MAINTENANCE AND SPARE PARTS

WARNING: Parts replacement and maintenance should not be performed in areas classified as hazardous due to the possible presence of flammable gases or vapors. Opening of the Data Manager Keypad is not recommended under any circumstances, due to the intrinsic safety of the analyzer. Violation of this policy could void the intrinsic safety rating and the warranty of this product.

SPARE PARTS

Table 4-1 lists the recommended spare parts.

Part Number	Description
CR015FA	Sample Line
CR015BQ	Probe Cap Assembly
4802	O-Ring
18598	Spring
TR103BC	Particulate Filter Cup
11049	O-Ring
CR015BM	Clear Chamber
18597	O-Ring
TR103BB	Water Trap Filter
CR015BS	Filter Support
102883-00	Keypad Glove

Table 4-1. Recommended Spare Parts

FILTERS AND O-RINGS

Most of the routine maintenance that can be done by the user does not require tools. Parts that need to cleaned or replaced under normal use can all be accessed by unscrewing the probe cap assembly. Refer to the diagram of the probe for identification and location of these parts, which include the metal particulate filter cup, the water trap filter, and the o-rings. Reassemble with the components oriented as shown in the diagram.

[**IMPORTANT**: When replacing the water trap filter, be sure to use the white disc only. The blue disc is a spacer used for packaging and is NOT a filter.]

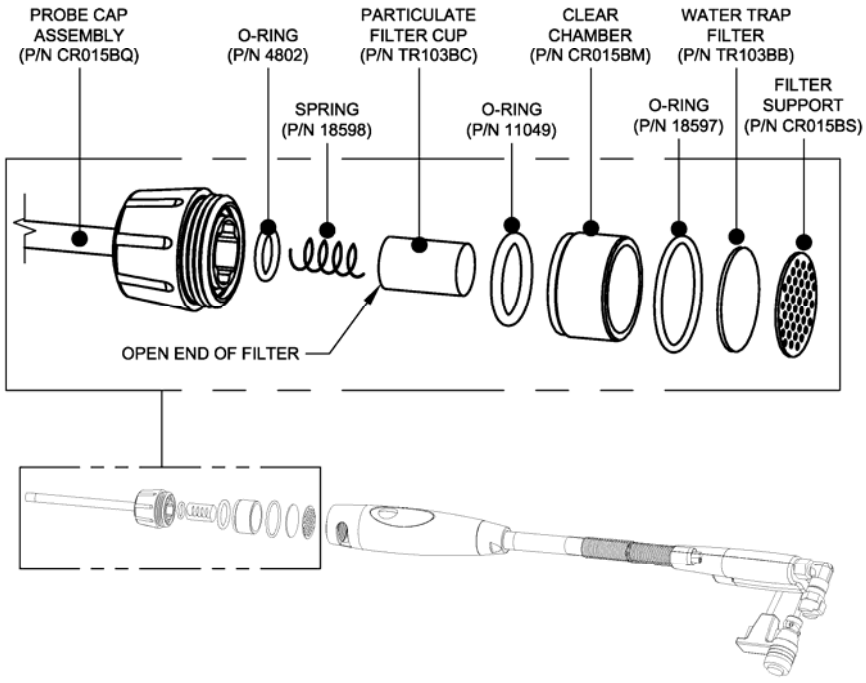


Figure 4-1. DataManager Probe Spare Parts

WATER IN THE PROBE

If any water or other liquid is drawn into the probe, it can be seen through the clear viewing window, and you may hear the TVA pump bog down. If this occurs, unscrew the probe cap to access the internal components the same way as described above. Drain all of the water out and dry all of the parts up to and including the water trap filter. No water will pass the water trap filter (although other liquids may do so.) Reassemble with the components oriented as shown in the diagram.

SAMPLE LINE REPLACEMENT

If the Teflon sample line gets contaminated or damaged, it will need to be replaced. This requires a large adjustable wrench, a razor blade, a 1/2" wrench, and a heat gun (optional.) The replacement sample line (Teflon tubing and ferrules) can be ordered from Fisher Scientific (p/n CR015FA). To replace the sample line (See Figure 4-2):

1. Using the adjustable wrench, unscrew the strain relief on the back of the probe and pull it, the compression sleeve, and the convoluted tubing away from the probe body to access the Teflon sample line. Note that the opposite end of the convoluted tubing slides freely into the junction box.

2. Using the razor blade, carefully cut the Teflon tubing so it can be removed from the stainless steel barbed fitting, then pull it out from the junction box end (the end with quick connect fitting and elbow.)

3. Using the wrenches, remove the 3/16" nut from the fitting, then slide the used sample line out of it and discard. Keep the nut and fittings.

4. Take the end of the new sample line (without the ferrules) and slide it all the way into the threaded end of the nut. Thread the nut back onto the fitting and tighten with a wrench until snug.

5. Slide the free end of the new sample line into the hole in the junction box of the harness assembly until it comes out the end near the probe.

6. Lay the whole assembly out in a straight line, and pull the sample line until the fitting on the other end is flush against the junction box, then cut the Teflon tubing so that it just long enough to fit over all three segments of the barbed fitting. Install the tubing onto the barbed fitting (carefully heating the tubing with a heat gun aids in installation.)

7. Slide the convoluted tubing onto the end of the probe body as far as it will go, then thread the strain relief (with compression sleeve) onto the probe body and tighten with a wrench until snug.

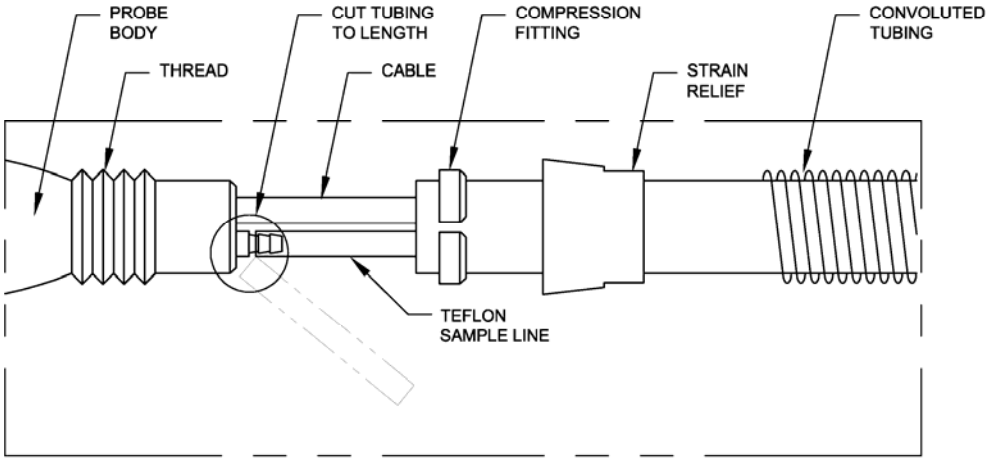


Figure 4-2. Sample Line Replacement

SERVICE LOCATIONS

For additional assistance, service is available from exclusive distributors worldwide. Contact one of the phone numbers below for product support and technical information or visit us on the web at thermo.com/aqi.

1-866-282-0430 Toll Free
1-508-520-0430 International

Appendix A
Warranty

Seller warrants that the Products will operate or perform substantially in conformance with Seller's published specifications and be free from defects in material and workmanship, when subjected to normal, proper and intended usage by properly trained personnel, for the period of time set forth in the product documentation, published specifications or package inserts. If a period of time is not specified in Seller's product documentation, published specifications or package inserts, the warranty period shall be one (1) year from the date of shipment to Buyer for equipment and ninety (90) days for all other products (the "Warranty Period"). Seller agrees during the Warranty Period, to repair or replace, at Seller's option, defective Products so as to cause the same to operate in substantial conformance with said published specifications; provided that (a) Buyer shall promptly notify Seller in writing upon the discovery of any defect, which notice shall include the product model and serial number (if applicable) and details of the warranty claim; (b) after Seller's review, Seller will provide Buyer with service data and/or a Return Material Authorization ("RMA"), which may include biohazard decontamination procedures and other product-specific handling instructions; and (c) then, if applicable, Buyer may return the defective Products to Seller with all costs prepaid by Buyer. Replacement parts may be new or refurbished, at the election of Seller. All replaced parts shall become the property of Seller. Shipment to Buyer of repaired or replacement Products shall be made in accordance with the Delivery provisions of the Seller's Terms and Conditions of Sale. Consumables, including but not limited to lamps, fuses, batteries, bulbs and other such expendable items, are expressly excluded from the warranty under this warranty.

Notwithstanding the foregoing, Products supplied by Seller that are obtained by Seller from an original manufacturer or third party supplier are not warranted by Seller, but Seller agrees to assign to Buyer any warranty rights in such Product that Seller may have from the original manufacturer or third party supplier, to the extent such assignment is allowed by such original manufacturer or third party supplier.

In no event shall Seller have any obligation to make repairs, replacements or corrections required, in whole or in part, as the result of (i) normal wear and tear, (ii) accident, disaster or event of force majeure, (iii) misuse, fault or negligence of or by Buyer, (iv) use of the Products in a manner for which

they were not designed, (v) causes external to the Products such as, but not limited to, power failure or electrical power surges, (vi) improper storage and handling of the Products or (vii) use of the Products in combination with equipment or software not supplied by Seller. If Seller determines that Products for which Buyer has requested warranty services are not covered by the warranty hereunder, Buyer shall pay or reimburse Seller for all costs of investigating and responding to such request at Seller's then prevailing time and materials rates. If Seller provides repair services or replacement parts that are not covered by the warranty provided in this warranty, Buyer shall pay Seller therefor at Seller's then prevailing time and materials rates. ANY INSTALLATION, MAINTENANCE, REPAIR, SERVICE, RELOCATION OR ALTERATION TO OR OF, OR OTHER TAMPERING WITH, THE PRODUCTS PERFORMED BY ANY PERSON OR ENTITY OTHER THAN SELLER WITHOUT SELLER'S PRIOR WRITTEN APPROVAL, OR ANY USE OF REPLACEMENT PARTS NOT SUPPLIED BY SELLER, SHALL IMMEDIATELY VOID AND CANCEL ALL WARRANTIES WITH RESPECT TO THE AFFECTED PRODUCTS.

THE OBLIGATIONS CREATED BY THIS WARRANTY STATEMENT TO REPAIR OR REPLACE A DEFECTIVE PRODUCT SHALL BE THE SOLE REMEDY OF BUYER IN THE EVENT OF A DEFECTIVE PRODUCT. EXCEPT AS EXPRESSLY PROVIDED IN THIS WARRANTY STATEMENT, SELLER DISCLAIMS ALL OTHER WARRANTIES, WHETHER EXPRESS OR IMPLIED, ORAL OR WRITTEN, WITH RESPECT TO THE PRODUCTS, INCLUDING WITHOUT LIMITATION ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. SELLER DOES NOT WARRANT THAT THE PRODUCTS ARE ERROR-FREE OR WILL ACCOMPLISH ANY PARTICULAR RESULT.

APPENDIX B

FILE FORMATS

This section describes logged data output from the TVA when using the DataManager Probe.

LOGGED DATA FILE

Format	Comments
LOGGED DATA<CR><LF>	Title, not processed
VER=xx.xx	xxxxx=ver, right just, lead spaces
<logged data record 1>	See below
.	
.	
.	
<logged data record n>	
<CR><LF>	Blank line, not processed
END<CR><LF>	Marks end-of-text

The Route Database format only supports Fugitive Emissions logging records. For details of the other record types, see the appropriate section in the main TVA manual.

```
<CR><LF>
FE DATA                                                                                                    LEAK   REPAIR<CR><LF>
  DATE       TIME    ihihihihihih...  thththththth...   DET      BACKGROUND           CONCENTRATION       LEAK    SOURCE  METHOD
chchch...<CR><LF>
---------  --------  isisisisisis...  tstststststs...   ---  --------------------  --------------------  -------  ------  ------
cscscs...<CR><LF>
dd mmm yy  hh:mm:ss  iiiiiiiiiiiiiii  ttttttttttttttt  ddd  xxxxxx uuu fffffffff  xxxxxx uuu fffffffff  lllllll  LLL     RRRRR
cccccc...<CR><LF>
```

NOTE: The following DBID fields are only displayed if a hidden database ID is defined in the route database.

ih... = dbid header (1-16 characters, centered, space padded)
is... = dbid separator (1-16 -)
iii... = dbid (1-16 characters, user defined in route database)

th... = tag header (1-16 characters, centered, space padded)
ts... = tag separator (1-16 -)
ttt... = tag (1-16 characters, user defined in route database)

NOTE: The following comment fields are only displayed if a Comment is defined in the route database file.

ch... = comment header (0-16 characters, centered, space padded)
cs... = comment separator (0-80 -)
ccc... = comment (0-80 characters, user input during log)

xxxxxx = concentration, floating point, right justified, leading spaces, or
"------" when DET_OFF

uuu = concentration unit determined by the current unit_lock at the time of the upload:
"PPB"
"PPM"
"% "

fffffffff = data status:
“OK ", no errors or alarms
"DET_OFF ", detector not valid
"DET_FAIL ", detector failed, not "DET_OFF"
"OVERFLOW ", A/D overflow, not "DET_FAIL"
"UNDERFLOW", A/D underflow, not "OVERFLOW"
"BAD_CALIB", invalid calibration parameters
"CAL_SLOPE", calibration sensitivity out of range
"CLAMPED ", an intermediate concentration exceeded 100%
"AVG_OVFLW", during log point averaging, an overflow occurred
"HIGH_ALRM", high alarm, no STEL, not "UNDERFLOW"
"LOW_ALARM", low alarm, no high alarm or STEL, not "UNDERFLOW"
"STEL_ALRM", STEL alarm, no low or high alarm, not "UNDERFLOW"
"HIGH&STEL", high alarm and STEL, not "UNDERFLOW"
"LOW&STEL ", low alarm and STEL, no high alarm, not "UNDERFLOW"

ddd = detector:
"PID"
"FID"

lllllll = leak indicator:
" OK ", no leak
"LEAKER!", leak

Sample Fugitive Emissions logged data:

```
LOGGED DATA
VER= 1.00

FE DATA
```

DATE	TIME	TAG	DET	BACKGROUND	CONCENTRATION	LEAK	LEAK SOURCE	REPAIR METHOD	COMMENT
19 MAR 03	13:10:35	1	PID	0.00 PPM OK	0.00 PPM DET_FAIL	OK	N/A	N/A	THIS IS MY FIRST COMMENT 1234560
19 MAR 03	13:11:02	2	PID	0.00 PPM OK	0.00 PPM DET_FAIL	OK	N/A	N/A	
19 MAR 03	13:11:14	3	PID	0.00 PPM OK	0.00 PPM DET_FAIL	OK	BON	GUNP	
19 MAR 03	13:11:35	3	PID	0.00 PPM OK	0.00 PPM DET_FAIL	OK	N/A	N/A	ALL FIXED!
19 MAR 03	13:12:20	4	PID	0.00 PPM OK	0.00 PPM DET_FAIL	OK	N/A	N/A	A
19 MAR 03	13:12:38	5	PID	0.00 PPM OK	0.00 PPM DET_FAIL	OK	N/A	N/A	

```
END
```

Note that the logging memory specifications have changed since the introduction of the TVA Data Manager. They are as follows:

Auto, logging rate:	1 log every 1 second to 999 minutes
Auto, storage capacity:	18,000 sample logs minimum with data only
VOC, logging interval:	1 log every 2 to 30 seconds typical
VOC, storage capacity:	8,500 locations minimum with data only 2,500 locations minimum with default route and data 850 locations minimum with maximum route and data (less if log comments is used)

CONFIGURATION FILE

This section describes the Configuration file output of the TVA.

Options are separated by a '|':

Format

CONFIGURATION<CR><LF>
VER=XX.XX<CR><LF>
<CR><LF>
MODEL=xxxxxxxxxx<CR><LF>
SERIAL NUMBER=idididididid<CR><LF>
DETECTOR=PID|FID|PID&FID<CR><LF>
OPERATOR ID=opopopopop<CR><LF>
<CR><LF>
LOGGING<CR><LF>
-------<CR><LF>
LOG MODE=NONE|AUTO|VOC|FE|CUSTOM<CR><LF>
LOG STORAGE FORMAT=NONE|FOXAUTO|FOXVOC|FEVOC<CR><LF>
LOG SAMPLE TIME=nnn<CR><LF>
LOG SAMPLE TIME UNIT=SEC|MIN<CR><LF>
LOG DATA STORED=SAMPLE|AVERAGE|MAXIMUM<CR><LF>
LOG UNIT LOCK=OFF|PPB|PPM|PERCENT<CR><LF>
LOG AUTO REPEAT=OFF|ON<CR><LF>
LOG SAVE MODE=MANUAL|AUTO<CR><LF>
TAG ACTIVE=OFF|ON<CR><LF>
ROUTE ACTIVE=OFF|ON<CR><LF>
BARCODE VERIFY=OFF|ON<CR><LF>
<CR><LF>
CALIBRATION<CR><LF>
-----------<CR><LF>
CAL AUTO ACCEPT=OFF|ON<CR><LF>
CAL AUTO SAVE=OFF|ON<CR><LF>
CAL UNIT LOCK=OFF|PPB|PPM|PERCENT<CR><LF>
BACKGROUND CORRECTION (PID)=OFF|ON<CR><LF>
BACKGROUND CORRECTION (FID)=OFF|ON<CR><LF>
<CR><LF>

```
RESPONSE FACTORS<CR><LF>
----------------<CR><LF>
SELECTED=n<CR><LF>
MODE=FACTOR|CURVE<CR><LF>
RF0 (PID)=DEFAULT    1.00   0.00<CR><LF>
RF1 (PID)=nnnnnnnnnn xx.xx +yy.yy<CR><LF>
                     .
                     .
                     .
RF9 (PID)=nnnnnnnnnn xx.xx +yy.yy<CR><LF>
RF0 (FID)=DEFAULT    1.00   0.00<CR><LF>
RF1 (FID)=nnnnnnnnnn xx.xx +yy.yy<CR><LF>
                     .
                     .
                     .
RF9 (FID)=nnnnnnnnnn xx.xx +yy.yy<CR><LF>
<CR><LF>
ALARMS<CR><LF>
------<CR><LF>
STEL (PID)=ffffff PPB|PPM|%  <CR><LF>
LOW  (PID)=ffffff PPB|PPM|%  <CR><LF>
HIGH (PID)=ffffff PPB|PPM|%  <CR><LF>
STEL (FID)=ffffff PPB|PPM|%  <CR><LF>
LOW  (FID)=ffffff PPB|PPM|%  <CR><LF>
HIGH (FID)=ffffff PPB|PPM|%  <CR><LF>
<CR><LF>
USER OPTIONS<CR><LF>
------------<CR><LF>
PROBE=BASIC|ENHANCED|DATAMANAGER<CR><LF>
BARCODE READER=NONE|HP|PSC<CR><LF>
KEY CLICK=OFF|ON<CR><LF>
DISPLAY DELAY=SHORT|MEDIUM|LONG<CR><LF>
PC LINK TYPE=TVAPC|FEMS|TEXT-MANUAL|TEXT-AUTO<CR><LF>
DIGITAL DATA LOGGING=NONE|FID&PID|SELDET<CR><LF>
<CR><LF>
END<CR><LF>
```

Notes:

1. Lines containing information on uninstalled detectors (PID) or (FID) are not output.

2. Spaces are allowed in names and other text fields entered by the user.

3. Number fields are right justified, leading spaces.

4. The second detector repeats the RF names. During download the last RF name encountered is used.

5. Log parameters must be correct for the specified log mode.

Sample Configuration file:

```
CONFIGURATION
VER= 1.00

MODEL=TVA-1000B
SERIAL NUMBER=012345678901
DETECTOR=PID&FID
OPERATOR ID=JOHN SMITH

LOGGING
-------
LOG MODE=FE
LOG STORAGE FORMAT=FEVOC
LOG SAMPLE TIME=5
LOG SAMPLE TIME UNIT=SEC
LOG DATA STORED=MAXIMUM
LOG UNIT LOCK=PPM
LOG AUTO REPEAT=OFF
LOG SAVE MODE=MANUAL
TAG ACTIVE=ON
ROUTE ACTIVE=ON
BARCODE VERIFY=ON

CALIBRATION
-----------
CAL AUTO ACCEPT=OFF
CAL AUTO SAVE=OFF
CAL UNIT LOCK=PPB
BACKGROUND CORRECTION (PID)=ON
BACKGROUND CORRECTION (FID)=ON

RESPONSE FACTORS
----------------
SELECTED=2
MODE=FACTOR
RF0 (PID)=DEFAULT     1.00   0.00
RF1 (PID)=HEXANE      2.00   0.00
RF2 (PID)=PROPANE     3.50   0.00
RF3 (PID)=CO2         0.33   0.00
RF4 (PID)=----------  1.00   0.00
RF5 (PID)=----------  1.00   0.00
RF6 (PID)=----------  1.00   0.00
RF7 (PID)=----------  1.00   0.00
RF8 (PID)=----------  1.00   0.00
RF9 (PID)=----------  1.00   0.00
RF0 (FID)=DEFAULT     1.00   0.00
RF1 (FID)=HEXANE      2.00   0.00
RF2 (FID)=PROPANE     3.50   0.00
RF3 (FID)=CO2         0.33   0.00
RF4 (FID)=----------  1.00   0.00
RF5 (FID)=----------  1.00   0.00
RF6 (FID)=----------  1.00   0.00
RF7 (FID)=----------  1.00   0.00
RF8 (FID)=----------  1.00   0.00
RF9 (FID)=----------  1.00   0.00
```

```
ALARMS
------
STEL (PID)=     0 PPB
LOW  (PID)=   100 PPM
HIGH (PID)=   200 PPM
STEL (FID)=     0 PPB
LOW  (FID)=   100 PPM
HIGH (FID)=   200 PPM

USER OPTIONS
------------
PROBE=ENHANCED
BARCODE READER=PSC
KEY CLICK=OFF
DISPLAY DELAY=MEDIUM
PC LINK TYPE=TEXT-MANUAL
DIGITAL DATA LOGGING=NONE

END
```

APPENDIX C

DIGITAL DATA LOGGING

To enable/disable digital data logging, from the main menu press 4=PCLink/Memory, 3=DigitalDataLog, then select 1=None 2=PID&FID, or 3=Selected Detector.

If digital data logging is enabled, streaming concentration data is sent out the serial port at the end of each measurement cycle (once per second) when the analyzer is in RUN mode. The digital data format is as follows:

Digital data log record:
pppppppppp sssssssss fffffffff sssssssss <CR><LF>

where:

pppppppppp = PID concentration, floating point, right justified, leading spaces, or
" " when PID detector not selected

fffffffff = FID concentration, floating point, right justified, leading spaces, or
" " when FID detector not selected

sssssssss = data status:
" ", detector not selected
"OK ", no errors or alarms
"DET_OFF ", detector not valid
"DET_FAIL ", detector failed, not "DET_OFF"
"OVERFLOW ", A/D overflow, not "DET_FAIL"
"UNDERFLOW", A/D underflow, not "OVERFLOW"
"BAD_CALIB", invalid calibration parameters
"CAL_SLOPE", calibration sensitivity out of range
"CLAMPED ", an intermediate concentration exceeded 100%
"AVG_OVFLW", during log point averaging, an overflow occurred
"HIGH_ALRM", high alarm, no STEL, not "UNDERFLOW"
"LOW_ALARM", low alarm, no high alarm or STEL, not "UNDERFLOW"
"STEL_ALRM", STEL alarm, no low or high alarm, not "UNDERFLOW"
"HIGH&STEL", high alarm and STEL, not "UNDERFLOW"
"LOW&STEL ", low alarm and STEL, no high alarm, not "UNDERFLOW

WARNING: Connection to the serial port is not approved for use in hazardous locations.